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ABSTRACT

This paper focuses on the elements of brain-compatible learning theory and instruction, noting its significance for students with developmental disabilities. The paper proposes a learning program for children (with and without disabilities) which is "brain-compatible," defined as "absence of threat." Eight elements are seen as critical in implementing a brain-compatible learning theory, and a variety of teaching principles are offered to support the first five elements. The eight elements are: (1) trust (suggestions cover ways to build classroom trust); (2) choices (ways to encourage authentic achievement in students); (3) meaningful content (ways to integrate the curriculum and maximize real world experiences); (4) adequate time (ways to help students construct meaningful schema and meet individual needs); (5) enriched environment (ways to design an enriched but focused classroom); (6) collaboration; (7) immediate feedback; and (8) mastery. (Contains 14 references.) (DB)

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Education's New Pole-Sitter: Brain-Compatible Theory and Integrated Thematic Instruction

(Colleague Idea Exchange)

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President Bush's administration declared the 90's to be the "decade of the brain." Much research was directed into how the brain functions, how it learns, how it recovers from injuries and how it affects our psychological and emotional being. The brain has long been misunderstood in educational circles. For too long we have centered curriculum, methodology and behavioral outcomes on 'lack of knowledge about the brain.' Leslie Hart in his book, Human Brain, Human Learning coined the phrase "brain-compatible". Simply put, brain-compatible means ***absence of threat.*** *A brain-compatible learning program takes into account several key elements that allow for this to take place. Before we look at those 8 elements, let me share an analogy with you.*

Let's pretend that I am the principal of school L. I have called into my office two staff members who will lead a playground committee I am forming. The playground committee will consist of 7 staff members, and their role is to look at our existing playground at school L and make recommendations to me concerning an upcoming event. Next year at our school we will have 25 multiply-physically handicapped students bused in. We will need to make some changes on the school playground in order to make it "compatible" for them. If we do not make changes, these students will be 'left out.' Many will not participate; many will not be included with peers; some may get hurt and others may lack the necessary skills to make use of existing equipment. My committee will look at the playground as it exists, and make recommendations on adaptations, modifications, changes and additions. The KEY is to make the playground 'compatible' for them regardless of the cost or change that is necessary to accomplish it. Using this analogy, what might happen in a learning environment which is NOT 'compatible' to the brain?
Is it not easy to see that the results would be very similar as to that of the playground?! Many students are in learning environments today that are 'brain-antagonistic'. Students are controlled and manipulated for much of the school day; they are
given very few choices about curriculum or learning; andmade to sit quiet for hours and hours without collaborating or sharing with peers. They are expected to keep up with all of their peers in every subject, at all levels. Teachers play "beat the clock", and allow the clock to run the curriculum. The school day is fragmented, splintered and haphazard!

A brain-compatible learning environment replaces this model. With the teacher as instructor, facilitator, guide and coach, the classroom comes alive in a new and unique way.. Brain-compatible learning for the 90's is theoretically based on brain research. Pioneers in the field of research and theory include: Leslie Hart, Marie Diamond, Howard Gardner, Paul McLean, Jane Healy, Richard Restak, Susan Barrett, Robert Sylwester, Candace Pert and the Society for Neuroscience.

What are the 8 elements that make up brain-compatible learning theory- Trust (absence of threat); Choices; Meaningful Content; Adequate Time; Enriched Environment; Collaboration; Immediate Feedback and Mastery. Any classroom in America can successfully implement these elements into their classroom and see immediate results. Let's take a look at each element and see the implications for student learning!

TRUST

There are ways to build TRUST into every classroom. Every classroom should be a safe environment for students. A non-threatening climate is essential in establishing a brain-compatible environment for students. An environment which is absent of threat provides a trusting environment for children to learn in without the fear of humiliation or intimidation. Collaboration and cooperation based on mutual respect replaces control. Through class meetings students can be taught the process of inclusion, influence and community. A resource book that gives good hands-on activities for class meetings is TRIBES by Jeannie Gibbs.

Every teacher works hard to instill certain work habits into his/her students. Social and work behaviors that are identified and posted in the room give students clear expectations on what is acceptable behavior, and which behaviors will promote productivity and self-pride. Susan Kovalik in her book, I.T.I.: The Model, lists 5 Lifelong Guidelines that teachers can use in their classroom- ***Active listening; No Put Downs; Truth; Trust and Personal Best.*** *Teachers talk about these Guidelines; share examples of them through literature; model them for the students; point them out as they are modeled by students in the classroom; and have students reflect on them in situations apart from the classroom. Lifelong Guidelines help every classroom towards its goal of building trust and inclusion. Dorothy Rich in her book, MEGASKILLS, outlines*

10 behaviors that students can benefit from at school. The Megaskills list includes: ***responsibility, caring, effort, teamwork, problem-solving, initiative, common sense, confidence, perseverance and motivation.*** *Again, teachers who reinforce these behaviors in a variety of ways in the classroom, will reap many benefits through their use. Of the classrooms where I have seen them used daily, and they have become a part of the teacher's vocabulary, I have seen dramatic changes in student behavior and work-study habits. The MEGASKILLS approach is a no-nonsense approach. Once students know what the expectations are, the teacher can become a "guide on the side" and not the sage on stage!*

Building trust in a classroom must involve other ingredients also. A teacher who is caring, and can relate to students on a personal level can more easily adapt new things to the classroom that will enhance his/her performance. A daily agenda will guide students through each school day. A daily agenda when posted allows students to ***know*** *what their day looks like and how to anticipate things throughout the day. For those children who are mathematical-logical, a daily agenda is a necessary part of their day. It also helps keep the teacher organized and provides information to subs, parents, visitors and peer colleagues, as they enter the classroom. The agenda can be in mind-map form, or a linear list of the days events. It is surprising how a simple tool like a daily agenda can help build trust in a classroom. Procedures are important as well. Students not only need to know what is expected of them in the classroom, but also in the lunchroom, at recess, in the hallway and on field trips. Teachers should take the time to have procedures posted in the room, or copies distributed to the students to keep in personal binders to refer to as needed. Procedures keeps everyone focused on what is expected and what is appropriate. Again, teachers can build trust in a classroom by 'being specific' and consistent with their expectations and procedures.*

Collaboration is another ingredient that helps build trust in a classroom. Students who are 'kept quiet' all day long, and separated from each other in rows cannot build good communication and problem-solving skills, as needed for the 21st Century workplace. As teachers look to find a working balance between direct instruction, guided practice, skill instruction and cooperative group activities, collaboration will be an element that provides the vehicle by which students and teacher can

work together to obtain common goals. Trust takes time. Building relationships takes time. Students must learn early in school that working together is not something that comes easy. Learning to influence; give-and-take; and share constructively is a process that must be nurtured through many experiences with many different peers. Collaboration and cooperation will take any class farther in their learning experiences if used appropriately.

CHOICES

Teachers have a variety of ways to teach curriculum to students. In a brain-compatible environment, students are empowered to become 'active learners' when given choices. It is a given in most classrooms that teachers ***want to assess all students*** *in several particular ways in a given subject. For instance, all students during the Desert component will give an oral presentation; construct their own desert diorama; and take a comprehension quiz at the completion of the study on the desert. Along the way, students will be studying* ***and experiencing*** *many new things regarding the desert, and will be given choices to show what they have learned through different assessment techniques by using inquiries (choice activities that support and reinforce the Key Points studied during the desert component). Choices allow students to rely on their most trusted modality, and problem-solving intelligence (and/ or learning style) to complete a project or activity. The four major modalities involved are kinesthetic, visual, tactile and auditory. Students may work independently, in small groups or with a partner. Each project or activity will vary depending on what the teacher is wanting the student to complete. A broad range of experiences will take students through art, music, drama, creative writing, reporting, interviewing, designing, etc. Howard Gardner's 7 intelligences will provide a framework for teachers to consider as they write inquiries. Bloom's Taxonomy offers different levels of thinking for inquiries to address. These thinking levels are: knowledge, comprehension, application, analysis, synthesis and evaluation. As Glasser states in his book, Control Theory, choice helps satisfy a child's basic need for power and freedom. Of students observed in this type of educational setting, it has been noted that students show more initiative in their work; they take more responsibility for the end-result; they collaborate more appropriately with their peers; they use*

common sense in searching out information needed for completion of the project; and they are more motivated to stay on task if the activity is of their own choosing. Does this mean we give unlimited choices to kids in school? No. But it does mean that we begin to explore ways as educators to get students more involved in their learning, and seek ways to "engage their minds" in creative, productive thinking that cannot occur with a daily diet of worksheets and workbook pages! Any teacher who taps into Gardner's 7 intelligences (musical, spatial, bodily-kinesthetic, verbal-linguistic, interpersonal, intrapersonal and logical-mathematical) will find a rich vein of exploration into discovering educational strengths of students, rather than shortcomings or failures. By keying in the 7 intelligences, we "free up" children to discover and develop talents unique to them. These talents can lead children into more depth learning and understanding of the material being presented. Fred M. Newman, Phi Delta Kappan (February, 1991) states that linking restructuring to authentic student achievement is based upon 4 premises:

1. *Students need a prior knowledge base (facts, vocabulary, theories, and formulas). This comes from direct instruction.*

2. *Students need to study fewer things in depth (rather than lots of things superficially).*

3. *Students need to integrate ideas. To have time to process and synthesize information. With this information to see and create relationships.*

4. *Students need substantive conversation (not didactic lecture). Time to collaborate with peers and refine, develop and process information is needed for students to 'construct' their own learning.*

Authentic achievement involves the challenge of PRODUCING rather than REPRODUCING knowledge! The idea of authentic achievement requires students to engage in disciplined inquiry to produce knowledge that has value in their lives beyond simply proving their competence in school. Mastery of this sort is unlikely to be demonstrated in familiar testing and grading exercises.

If it is true that choices empower students to become active learners--then why are so many teachers hesitant to "shift paradigms"? The greatest fear is that of losing control. It has been said that "our insecurity is not based on the presence of fear, but on the absence of control!" As long as teachers continue to "control" students through intimidation, humiliation, rewards/punishment, and other contrived ways of authority, students will never be given the opportunity to become responsible for their own behaviors, nor have the freedom to grow and prosper in an environment that empowers them to be decision-makers and productive students. Keeping a balance between clear-cut expectations and goals and giving students choices, is the key to maintaining a healthy environment for all students to learn. Swinging the pendulum extreme either way will disrupt the process of mutual respect and trust in the classroom.

MEANINGFUL CONTENT

As classroom teachers develop curriculum that is age-appropriate, it is imperative that the curriculum be meaningful and relevant. In many classrooms, skills and content are taught in isolated, fragmented parts with no 'hooks' or connections for kids to see relationships. David Perkins, author of Smart Schools (1991), says "educators often seem to adopt a kind of 'chocolate box' model of learning; they attempt to put more isolated chocolates of diverse flavors into the expanding chocolate box of the mind. Unfortunately, that is not the way understanding works. ***All people ever have is their own understanding; you can tell them all sorts of things, but you can't make them believe it unless they also construct it for themselves*** *(Eleanor Duckworth, Harvard University-1992). When the emphasis in traditional education remains on kill-and-drill of factual knowledge, students do not develop a framework of conceptual knowledge that will take them farther in the learning process. Howard Gardner of Harvard puts it best: "Even students who exhibit all the overt signs of success (those who get good grades in school) typically do not display an adequate understanding of the materials and concepts with which they have been working"*

(meaning they cannot use information learned in a new or unanticipated situation). Why is this? Factual information needs 'hooks' upon which to hang concepts and understanding beyond the knowledge and comprehension levels. We need to spend less time trying to 'beat the clock' and 'cover' everything, and spend more time studying fewer things in depth. We need to prepare students to ***use information in new situations (consolidating memory networks)*** *and master situations that resemble the experiences they might encounter in real life. Too often the skills and knowledge that is emphasized in school has no perceived value or real meaning to the student.* <u>Educational Leadership</u> *(April, 1993) suggests that our job is to move as many learning tasks as possible along a continum towards authentic assessment. Given knowledge, allow students to use this acquired knowledge to explore phenomena or ideas; share hypotheses with others; predict and conjecture outcomes; and revise original thinking (Center for Constructivist Teaching, ASCD Update, March, 1992). Meaningful content is critical in a brain-compatible learning environment because it focuses on student understanding of content and ability to use information, rather than on mastery of relatively isolated knowledge of items and skill components.It requires learners to actively construct meaning to make their own sense of information, to generate examples and relate the content to what they already know rather than passively receive or copy data; to focus on authentic tasks that call for problem-solving, critical thinking, and/or creatively rather than just memorizing information. Meaningful content also requires teachers to limit the breadth of material addressed and structure what they do teach around important concepts rather than to try to cover everything (Pat Wolfe, 1993). Curriculum that is integrated across subject lines brings "pieces into focus" with a bigger idea or concept. Susan Kovalik, author and consultant in Seattle, WA, has authored* <u>I.T.I.: The Model</u>*, which shows teachers how to organize their curriculum through a year-long theme. Susan understands the significance of brain-compatible learning, and in her book skillfully presents how any teacher can make their classroom come alive through developing a year-long theme, and creating Components, weekly Topics, Key Points and Inquiries through the content areas. It is easy reading, and presented in a way that empowers teachers to take charge of the curriculum in their classroom, and empower students to become active learners! For*

curriculum to be meaningful, it must be relevant to the real world and provide students the opportunity to learn in a way that is 'compatible' to their modality preference, learning style and experience base. Because brain research is bringing to us new information almost every day, we can see that since the brain is a pattern-seeking device, learning is going on all of the time and the more we integrate learning through subjects, the more 'hooks' we can hang relationships on to build conceptual understanding. The brain is a parallel processor- it assimilates different kinds of information simultaneously (Paul Messier, 1990). No two brains are identical! Each is a different kind of learner, thinker, and conceptualizer. The brain learns at accelerated paces. If the brain feels threatened, the program for "fight or flight" will take charge. The brain stores information by logical, emotional and sensorial associations. Information that is "meaningless" or "emotion-less" is difficult to be stored and retrieved. Comprehension hinges on the brain seeking meaning and relevance by linking old information to new information. As with the senses, the greater the number of modality links- the better the comprehension! Learning is intrinsically rewarding. Therefore we 'help' create patterns for the brain when we connect our curriculum, rather than fragment parts throughout the day. Frank Smith, author of Insult to Intelligence, says that the brain is always learning; learning does not require coercion; learning is incidental; learning is collaborative; learning always involves feeling; and learning must be free of threat! A brain-compatible classroom is designed to allow the brain to function at an optimum level. Integration through the curriculum allows students to see connectedness, as well as meaningfulness. As students are given adequate time to study fewer things in depth, they can master and achieve more. Without meaning, the battle is lost! "Anything that captures students' attention and gets their minds engaged, has the potential to produce learning; if there is no attention and no engagement, there will be no learning (Pat Wolfe, 1993).

When integrating curriculum it is ***important*** *that real world experiences (or "being there" experiences) provide a basis by which direct instruction can have meaning. Schools that are limited in the number of field trips they can take each year should remember this: "Field trips DO NOT SUPPLEMENT the curriculum, THEY ARE THE CURRICULUM!" The classroom must be enlarged beyond the 4 classroom walls to engage*

students in inquiry about the world in which they live. When field trips are possible, special speakers can come into the classroom, or hands-on-experiences can provide 'hooks' to enrich the curriculum and give depth to conceptual understanding. If students are to learn more than facts and statements, or more than rules and formulas, we must go into the world to provide opportunities for children to access information through all the senses and modalities, and inquire, question, probe, discover, delve, predict and construct. As Susan Kovalik (1993) says, "Curriculum should be framed so as to reduce "talking about" content, and be based on exploration, discovery and application of the concepts to the real world."

ADEQUATE TIME

The traditional classroom in America does not operate on the premise of adequate time. Many teachers hurry through their curriculum barely having enough time to cover everything. Students are not given enough time to process and master skills and concepts. Too often in school we allow the clock to 'run the curriculum.' Rather than 'starting and stopping' a dozen times during the day, and playing 'beat the clock', teachers need to give students adequate time to build mental programs of learning. Teaching in fragmented time slots puts students at a disadvantage to build concepts, master skills, discover, question and access information. It is more productive to work in 'blocks' of time allowing for direct instruction, inquiry, practice and mastery. Opportunities for collaboration and group work can occur more frequently if adequate time is given for students to work. Adequate time is needed to process new information and form new schemas. A schema is a framework, or general knowledge about a particular subject. Constructivists say that schemas are our way of constructing learning in a way that we understand. A schema provides a structure or guide for understanding. In order to comprehend, we select a schema that seems appropriate to fill in the missing information (Pat Wolfe, 1993). Without appropriate schemas, students cannot comprehend new information which brings new vocabulary, new contexts, and new conceptual learning. For any classroom to be brain-compatible, ***adequate time*** *must be given for*

students to acquire information and construct schemas of learning that give meaning to the content. Time must be taken to teach different patterns of input that help create programs of learning. It is important to remember that "less is best." Howard Gardner says that the #1 enemy of education right now is the term "coverage." He feels that as long we continue to hurry students through school trying to cover everything, we will assure students of not understanding material as it is presented. For the educators that take adequate time seriously, there is a payoff! Immediate feedback is more possible as students are building mental programs and acquiring information. Immediate feedback is necessary to make sure that mental programs of learning are accurate! Unlearning something incorrectly stored in the brain is much more difficult than learning it right the first time. The road to mastery is more attainable when immediate feedback is part of the school day, and when adequate time is given to acquire new skills.

Adequate response time is another benefit by allowing adequate time in the classroom. All students learn at different rates, and respond at different rates to questions and inquiries. Bates, in his book Please Understand Me, talks about introverts and extroverts. Extroverts think out loud, giving rapid responses; introverts process first and put forth an edited version. They require much longer response time (Kovalik, 1989). Students are at differing levels in problem-solving, language acquisition, synthesizing and evaluating information. Adequate time insures that all students will develop skills more readily when given the time to build accurate mental programs. If long term projects are assigned, adequate time is needed to involve all of the necessary steps from starting to completing the task. Students who have been nurtured in the MEGASKILLS program (by Dorothy Rich) have the time to develop the skills of initiative, perseverance, problem-solving, motivation, responsibility, effort, caring and teamwork while engaged in their project. Hurrying students along only encourages frustration, sloppy work, half-hearted effort and an incomplete product. A teacherwho values adequate time, and carefully finds a balance between it and maintaining a pace that is brisk, will find that students benefit from the additional time needed to grasp new concepts and skills, and make application to the real world. Adequate time also nurtures the concept of "chunking". A chunk is any coherent group of items of information that we can remember as if it were a single item. Benjamin Bloom was

quoted as saying, ***"The difference between novices and experts in a field appears to be that experts tend--because of a great deal of experience in a field--to organize information into much larger chunks, while novices work with isolated bits of information."*** *The significance of this comment is that integrated curriculum that connects learning does require more time (adequate time) to "chunk" information, thus leading students to become experts in the field of study they are engaged in. The more connections that appear in the curriculum, as well as "being there" or first-hand experiences, the more likely students will "chunk" information, rather than store isolated, fragmented bits of information throughout the day. Again, adequate time is brain-compatible because the brain needs time to retrieve, store and process information as it is coming in. As the brain determines information that is emotionally relevant, it will pay attention to it and send it into short-term memory. Repeated activation of the neurotransmitters in the brain allows messages to be sent more effectively, and allows the brain to store information in long-term memory. Rote-rehearsal provides for continuous, deliberate repetition of material, which is stored in short-term memory. Elaborative rehearsal involves integrating information--giving it some kind of meaning-creating "chunks" of information that the brain can quickly retrieve when needed. Adequate time is a concept that will be elusive to a teacher who is not flexible. Maintaining one's poise and calm amidst a clamor of activity, questions and discovery can pay dividends for those teachers who "want to watch their students grow dendrites!"*

ENRICHED ENVIRONMENT

Many teachers historically have taken their learning environment and 'decorated' it with holiday and seasonal things. In addition, a smors-gasboard of colorful teacher-made cut-outs, posters and miscellaneous items permeated the room to make it attractive and inviting. Some rooms were so cluttered with so many things, that one could barely decipher one thing from another. Brain research is giving us a new perspective on the learning environment. Although there were a few teachers who always KNEW how to set up a meaningful learning environment, we are beginning to realize the importance of more teachers designing their environment in a "brain-compatible way". We call this an enriched environment.

What does research tell us? Research in the areas of color, music, lighting and spatial design are indicating that the environment we establish WILL affect mood, attention and learning. Marian Diamond, professor at the U. of California-Berkeley, looked at impoverished environments vs. enriched environments as a vehicle for learning, attention, stimulation and interaction. She found that ***an enriched environment produced physiological changes in the brain!! In an enriched environment there was increased cell weight; there was increased branching of dendrites; and there was more attention to physical space. In an impoverished environment there was a decrease in the size and number of cells as well as diminished branching of dendrites (Enriching Heredity, 1988).*** *With this study, educational administrators for the first time had research validate what they had long believed--a learning environment is not a "display room", but rather a vehicle by which we access and internalize learning. Leslie Hart in his book, Human Brain, Human Learning describes an enriched environment as:*

+ *non-threatening*
+ *interactive*
+ *respects natural thinking*
+ *emphasize communication*
+ *provide for much manipulation*
+ *address learning to actual productive uses*

Pat Wolfe, nationally recognized speaker and consultant on brain-compatible instruction and brain research, refers to an enriched environment as ***an environment which is stimulating and challenging and in which the student's mind is actively involved.*** *No matter how well planned, how interesting, stimulating, colorful or relevant the lesson, if the teacher does all the interacting with the material, the teacher's--not the student's--brain will grow (Pat Wolfe, 1993). An enriched environment is not only important in terms of physical space and attractiveness, but* ***in it's ability to stimulate and promote student interaction with the real world and address learning to actual productive uses.*** *This involves moving slowly away from all assessment being "paper/pencil" driven, and moving towards authentic assessment in which students have choices to show* ***what they have learned*** *through different assessment techniques and learning styles. Less clutter; fewer*

paper/pencil tasks; more meaningful information displayed and opportunities for students to collaborate and communicate through different levels of thinking.

An enriched environment ***is*** *a non-threatening environment. A brain-compatible environment is built on the premise of absence of threat; collaboration; inclusion and immersion. An environment that is free of threat will be designed to welcome the learner into it's space, and provide a level of comfort for the learner to feel safe and significant. The physical environment may include a lamp and plants to give a friendly, welcome feeling. Since plants give off oxygen into the air, and take in carbon dioxide, they are also 'healthy' to have in the room. Research has indicated that colors attribute to particular moods and feelings. Rooms that are 'bright and flashy', or 'splashed with too many colors' may be distracting to some learners. Therefore, a room that is carefully color-coordinated would be more brain-compatible then one that is not carefully planned. Music has been shown to provide relaxation and calm to students. Soft music, such as classical music, can provide a backdrop that allows students to shut out classroom noises or distractions (overhead lights, heater, a.c., hall noise, etc.). Music can be used to welcome students as they enter their classroom each morning, and also during collaboration time, or project time, when noise may be more prevalent in the room, and music can add a mellowing effect. Color, lighting, music and smell all have the power to change: mood, physical behavior and learning behavior (Carol Venolia, Healing Environment).*

"Immersion" is a term relatively new to many professional educators. Immersion refers to a classroom reflecting what is being studied. So often classrooms carry "mixed messages" about many different things being learned at one time. This reflects a curriculum that is fragmented and not integrated. In immersion, the environment would reflect specifically what the children are studying (oceans, regions, insects, neighborhood, rain forest, etc.). Student work would be displayed, as well as the Key Points being learned through the Science/ Social Studies. Posters, displays, hands-on materials, book table, etc. would all reflect the topic being studied. This "immersion" provides students many opportunities to use information, as well as access information. The room is not a "hodge-podge" or collage of many different subjects and

topics, but one related unit (broken down into topics) that the students will study in depth. Therefore, an enriched environment does take into account the physical space involved in having group work; providing a resource table; posting Key Points and Inquiries for students to work with; and having a space designated for 'direct instruction' such that when a teacher "enters that space" students know that it is time for active listening. The classroom environment is SIGNIFICANT. A classroom environment should reflect content because 70% of brain input comes through the environment (Sheila Ostrander, Superlearning).

An enriched environment promotes collaboration and inclusion. A classroom is more than physical space. A classroom is a laboratory for learning. We learn independently, as well as interdependently. For students to process, question, delve and problem-solve opportunities to work together must exist in a brain-compatible learning environment. Students DO NOT automatically know how to work together collaboratively! Teachers must take time to have class meetings, or friendship circles, to build trust, inclusion and influence in their classroom. Resources that can help a teacher in this area are books by Jeannie Gibbs and Claire LeMeaur (Tribes and Winners Circle). WITHOUT TRUST AND INCLUSION IN A CLASSROOM, THERE CAN BE NO COOPERATION. It is imperative that teachers understand the significance in providing opportunities for students to build mutual trust and inclusion in order to more effectively collaborate as learners.

An enriched environment provides first-hand learning experiences for students. When field trips are limited, teachers should look for ways to bring resource people into the classroom. Tables with "manipulatives, books and other items of interest" will allow students to ask questions, examine and become curious with the topical area. "Manipulatives" DO NOT include workbooks, worksheets or textbooks. Teachers should be careful to give specific directions and expectations for items borrowed from other individuals or libraries. This provides students with the chance to learn responsibility and caring. An enriched environment will become the "learners habitat". Without experiences, there are no concepts; without concepts, there's no attention span because they don't know what people are talking about" (Jane Healy, Endangered Minds).

Lastly, a brain-compatible learning environment that is "enriched"

will provide students those opportunities to access information relevant to their well being & achievement in school. More and more classrooms are using daily agendas to give the students an "overview" of the day and let them see the day as organized, planned and enjoyable (Susan Kovalik, 1991). A daily agenda provides an organized framework for the day, and at the end of the day the agenda can be referred to as a check against what was accomplished and learned, and provide a lead-in to tomorrow's schedule, and any work that needs to be finished at home. Procedures are equally important in a classroom that is building student trust. Procedures let students know what is expected and how things are to be done. Any classroom that operates without specific procedures, will find student rule violations and infractions to be numerous and frequent. Procedures guide and direct students. Every one knows what is expected, and class meetings can focus on problems that persist with student misbehavior or work-study habits that have not been developed, or need fine-tuning.

Summary

This paper has focused on the elements of brain-compatible learning theory and instruction. It's significance for ALL learners provides us a backdrop for those students with developmental disabilities. Brain-based education will take us farther in our understanding of the intelligences we all possess; it will take us farther in our developing authentic assessment techniques for ALL learners; it will provide us with a vehicle by which we develop more meaningful curriculum for students, as well as enrich learning environments and opportunities for students to build trust and inclusion. Brain-compatible learning is based on a collaboration of research and theory, and therefore is "in-process". As research opens up new meanings and understanding of the brain, our construction of brain-compatible programs will be more clearly defined and organized. We go with what we know 'now', and look to improve that as we gain more knowledge about brain function and physiology. Brain research will continue to open new doors to professional educators, and provide new insights into working & developing meaningful educational programs for ALL learners!

Bibliography

Diamond, Marion. Enriching Heredity: The Impact of the Environment on the Anatomy of the Brain. Free Press, New York: 1988.

Gardner, Howard. Frames of Mind: Theory of Multiple Intelligences Basic, 1985.

Gibbs, Jeannie. Tribes: A Process for Social Development and Cooperative Learning. Center Source Publications, Santa Rosa, CA: 1987.

Glasser, William. Control Theory in the Classroom. Harper & Row, New York: 1986.

Hart, Leslie. Human Brain, Human Learning. Longman, New York: 1985.

Healy, Jane. Endangered Minds: Why Our Children Don't Think. Simon and Shuster, New York: 1990.

Kovalik, Susan. Teachers Make the Difference. Susan Kovalik & Associates, Arizona: 1989.

Kovalik, Susan. I.T.I.: The Model. Books for Educators, Arizona: 1993.

LeMeres, Clare. Winners Circle. LeMeres Lifestyles Unlimited, New Port Beach, CA: 1990.

Perkins, David. Smart Schools. Free Press, New York: 1992.

Rich, Dorothy. MegaSkills. Houghton Mifflin Co., Boston: 1992.

Smith, Frank. Insult to Intelligence. Arbor House, New York: 1986.

Venolia, Carol. Healing Environments. Cestial Arts, CA: 1988.

Wolfe, Pat. Mind, Memory and Learning. Napa, CA: 1990.